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National Marine Fisheries Service
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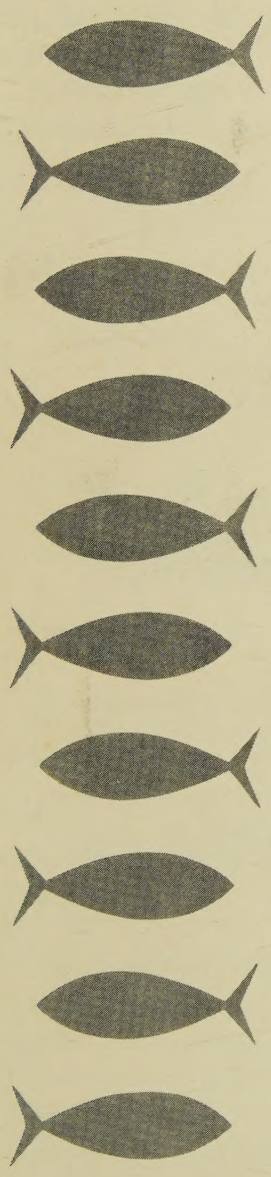
Southwest FISHERIES SCIENCE CENTER

HONOLULU LA JOLLA MONTEREY TIBURON

REPORT OF ACTIVITIES First Quarter 1997



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ANTARCTIC ECOSYSTEM RESEARCH GROUP

La Jolla, California

1997 Antarctic Field Research Started

For the last eight years, the U.S. Antarctic Marine Living Resources (AMLR) Program has conducted field research in the vicinity of Elephant, Clarence, and King George Islands, which are part of the South Shetland Islands at the tip of the Antarctic Peninsula (Fig. 1). The goal of the research is to describe the functional relationships between krill, their predators, and key environmental variables.

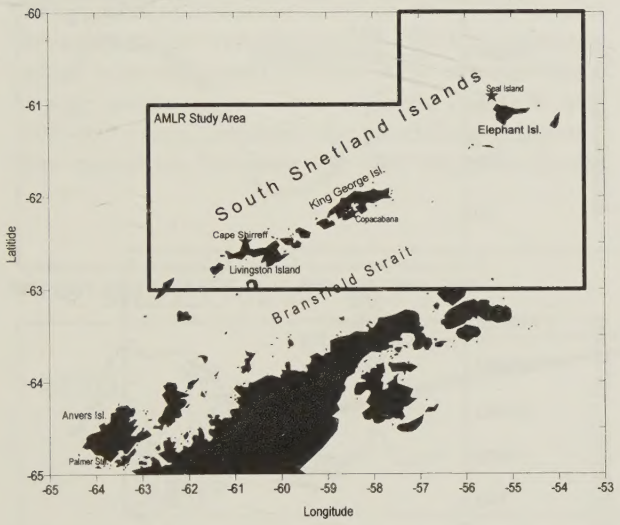

Figure 1. Locations of the U.S. AMLR field research program: AMLR study area, Cape Sherriff, Seal Island and Palmer Station.

The first leg of shipboard studies was conducted aboard the chartered Russian research vessel *Yuzhmorgeologiya* from January 19 to February 14, 1997. The ship departed Punta Arenas, Chile, for Leg I four days later than originally planned due to a delay in the arrival of the main AMLR cargo shipment. Despite the delay, all original objectives for Leg I were completed. During Leg I, researchers mapped mesoscale (10s to 100s of kilometers) features of water mass structure, phytoplankton biomass and productivity, and zooplankton constituents (including krill) in the area around the South Shetland Islands. The researchers conducted acoustic and net sampling of krill (small, shrimp-like crustaceans which are an important food source for whales, seabirds, fishes and squid) and used electronic instruments to measure ocean currents, temperature, salinity and other oceanographic information. The ship also delivered personnel and supplies to three land-based field sites: Copacabana field camp (King George Island), Cape Shirreff (Livingston Island), and Seal Island. The delivery to Cape Shirreff included building materials for a new AMLR field camp.

Following Leg I, the ship returned to Punta Arenas to exchange personnel and to prepare for the second leg of the research cruise.

The predator/prey data collected during the research cruise are needed to formulate U.S. policy on the conservation and international management of resources living in the oceans surrounding Antarctica. The AMLR Program advises the U.S. delegation to the Convention for the Conservation of Antarctic Marine Living Resources, part of the Antarctic Treaty system. (J. Martin, 619-546-5600)

COASTAL FISHERIES RESOURCES DIVISION

La Jolla, California

Center and Japanese Scientists Collaborate in Study of Japanese Sardine

Researchers at the National Research Institute of Fisheries Science in Yokohama, Japan, and the Southwest Fisheries Science Center (SWFSC) are completing collaborative studies of the population dynamics of sardine (*Sardinops melanostictus*) along the Pacific coast of Japan. The work is being conducted under the auspices of several international research programs that deal with long-term climate change. Like California sardine (*S. sagax*), Japanese sardine are sensitive to climate change, and popluation dynamics in the two regions may be related. This report includes preliminary results and conclusions.

Japanese sardine are small, short-lived, pelagic fish found in shoals along the Asian coast from Korea to the southern Kuril Islands. Decadal periods, or "regimes," of high abundance and high productivity have alternated with periods of low abundance and low productivity in Japanese sardine, California sardine, and other clupeoid stocks. Regimes tend to occur synchronously in clupeoid

stocks at different locations around the world, indicating that variation in global climate may be the cause. When abundance is high, Japanese sardine support one of the largest fisheries in the world. Most of the Japanese sardine harvested during each year (72% in 1985 and 60% in 1994) come from the Pacific coast of Japan. Catches of Japanese sardine (a crude index of abundance) declined dramatically after 1984, most likely because of a regime shift.

The causes of fluctuations in abundance regimes in most clupeoid stocks are unknown. Long-term variation in environmental factors associated with ocean temperatures affects abundance and productivity of California sardine. Periods of high abundance and productivity in Japanese sardine may be linked to relatively warm water on spawning grounds and cool water on feeding grounds resulting from strong winter monsoons off the coast of Asia.

The researchers estimated abundance and recruitment of sardine along the Pacific coast of Japan from 1951 to 1991, a span that includes a period of increasing abundance (favorable regime) and two periods of low or decreasing abundance (unfavorable regimes). In the past, catch data were used to measure trends in abundance of Japanese sardine. Up until now, estimates based on modern models and more comprehensive catch data have not been available. Hypotheses about long-term environmental change and estimates of spawner-recruit relationships were tested with modeling results.

Fishery data (total catch and catch-at-age) and three indices of abundance were available for modeling. Catch per unit of effort (CPUE) was defined as catch per hour of search time in the purse seine fishery off Hokkaido during 1976–92. After 1992, CPUE data were not available because the Hokkaido fishery ceased operation when sardine abundance and availability in northern fishing grounds declined. Annual egg production data (eggs per year) for 1951–91 were based on extensive ichthyoplankton surveys. The survey pattern currently consists of about 1,400 stations, most of which are occupied twice during each year and at least once during the sardine spawning season. The recruitment index for sardine was CPUE in the winter purse seine fishery off central Honshu. The fishery takes immature sardine on their wintering grounds from January to March.

Virtual population analysis (VPA) and the ADAPT tuning procedure were used to estimate sardine abundance and recruitment during recent years (1976–91) with available catch-at-age data. A simple, age-structured spreadsheet model was used to estimate sardine biomass during early years (1951–75) without catch-at-age data.

Biomass and recruitment estimates for Japanese sardine (Fig. 1) varied over three orders of magnitude during 1951–91. Peak sardine biomass (ages 0+) was about 18.4 million metric tons (t) in 1987, and minimum biomass was about 21,000 t in 1966. Biomass was low (100,000 t) before 1974, except during a short-lived increase in 1960–61. Both biomass and recruitment decreased after 1960 to record lows before increasing steadily to record high levels during the mid–1980s. The "recruitment failure" during 1988–91 was dramatic by recent

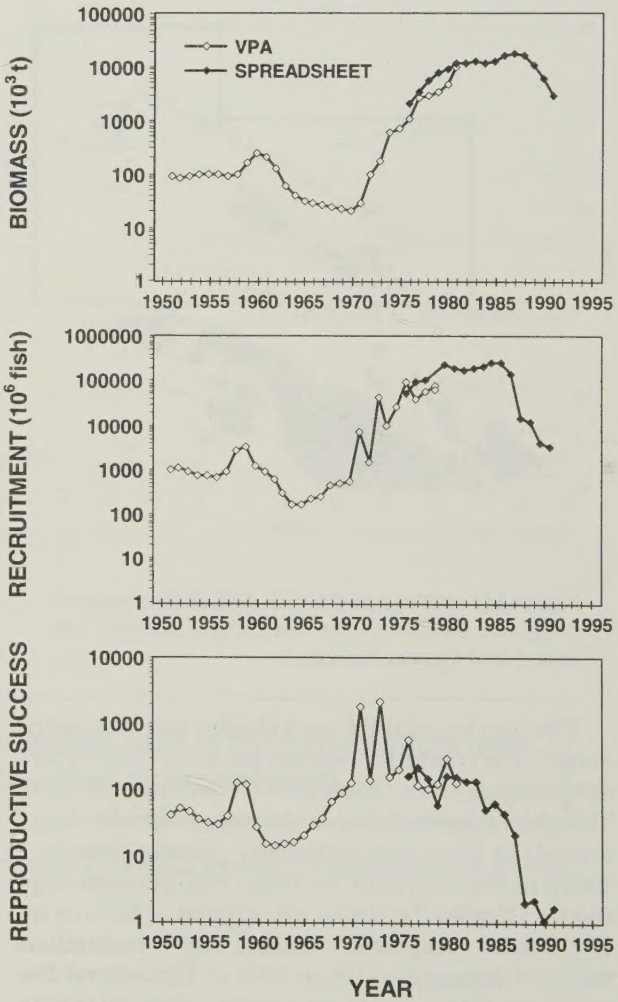

Figure 1. Biomass, recruitment, and reproductive success for Japanese sardine as determined by virtual population analysis (VPA) and a simple age-structured spreadsheet model.

standards, but recruitment did not decline as low as at any time before 1974.

Like biomass and recruitment, reproductive success (recruits divided by egg production) for Japanese sardine varied over three orders of magnitude during 1951–91 (Fig. 1). Reproductive success was moderate during 1958–59; declined to very low levels in the early 1960s; then increased to record high levels during the early 1970s as sardine abundance increased; and declined steadily after 1983 to record low levels during 1988–91.

Hypotheses about climatic and environmental effects on reproductive success of sardine were tested. Spawner-recruit models were fit using linear regression of $\ln(R_y/E_y)$ on $\ln(E_y)$ where R_y and E_y were recruitment and egg production. The logarithm of egg production (predicted values for the egg production index from models) was used as the independent variable (rather than the arithmetic values typically used) because of the extreme range in egg production. Two regimes (1951–70 and 1971–91) were assumed for modeling purposes. The transition between the two regimes during 1970–71 corresponds to a change in the relation between reproductive success and egg production for sardine and the beginning of a period of increasing abundance (Fig. 1).

The best hypothesis and spawner-recruit model for reproductive success in Japanese sardine included a regime (long-term environmental) effect and a density-dependent effect. The spawner-recruit curves for Japanese sardine implied by the regression model were shaped like ordinary Ricker curves (Fig. 2). The spawner-recruit curve for the favorable regime during 1971–91 was distorted by the period of anomalously low recruitment during 1988–91.

Carrying capacity (in units of eggs per year) for Japanese sardine was calculated on the basis of spawner-recruit results. Regression parameter estimates indicate that the carrying capacity for Japanese sardine during 1971–91 was about 79 times (almost two orders of magnitude) greater than carrying capacity during 1951–70. The cause of the increase during the early 1970s is unknown, but the researchers believe it could only have been a large

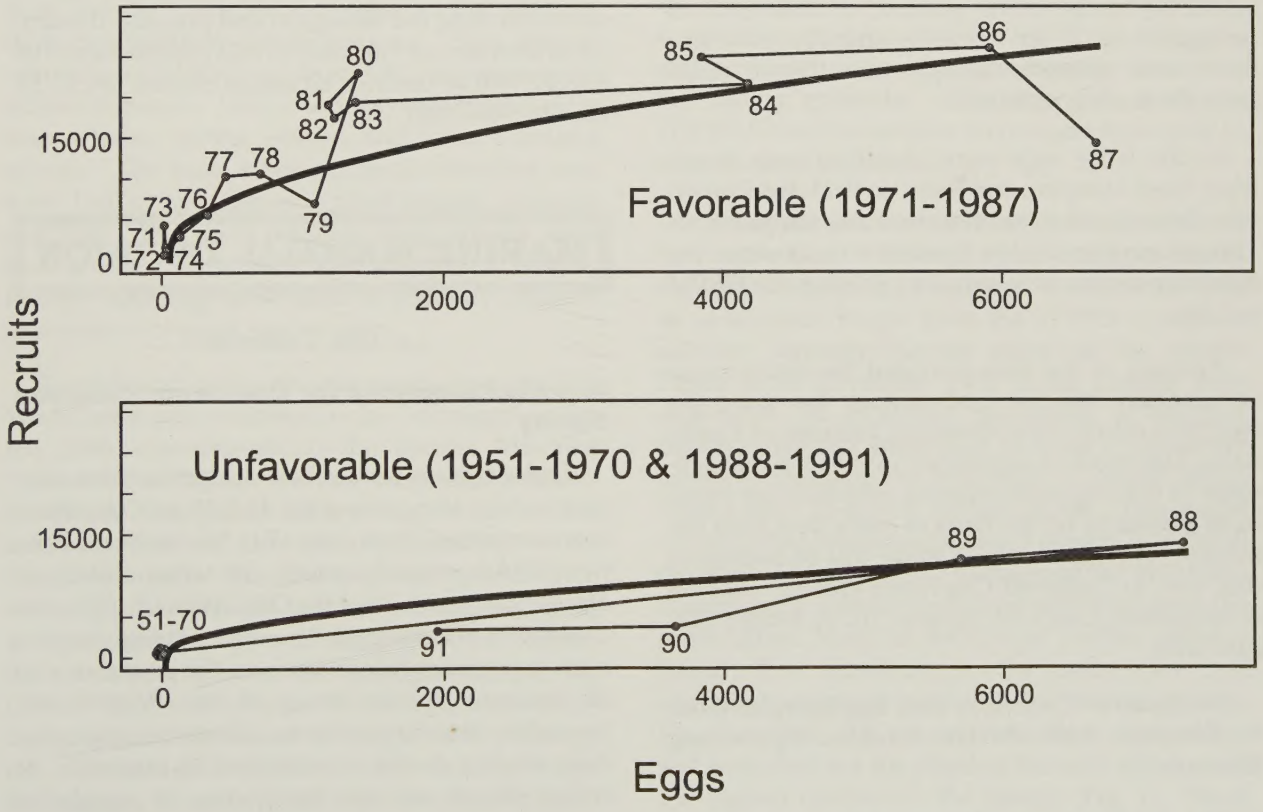

Figure 2. Spawner-recruit curves for Japanese sardine.

change in the physical environment off the Pacific coast of Japan. (L. Jacobson, 619-546-7117)

Vertical Distribution of Pacific Hake Eggs Determined

The daily egg production method (DEPM) is an effective fishery-independent means for estimating the biomass of commercially important fish stocks. It has been used principally for coastal pelagic fishes, but a modification of the method has been used for demersal fishes. Because the method is based on the abundance of planktonic eggs, it is critical that their age-specific vertical distribution be determined.

In March 1995, the Coastal Fisheries Resources Division conducted a cruise aboard the NOAA research vessel *David Starr Jordan* to test an adaptive sampling strategy for collecting the eggs and larvae of Pacific hake and to determine the eggs' vertical distribution in relation to stage of development, age, and temperature. More than 100 oblique bongo net tows were made on five onshore-offshore transects from Dana Point to Monterey, California. The catches were sorted, and when high concentrations of Pacific hake (*Merluccius productus*) larvae were present, a close-interval hexagonal set of six vertically stratified plankton tows was taken to sample nine depth strata from the surface to 300 m.

Pacific hake eggs were identified and staged from these samples, and their vertical distribution was determined in relation to water temperature. This information makes it possible to construct the mortality curves necessary for applying the DEPM to hake.

Analysis of the data provided the background information and the methodology for using the DEPM to estimate the spawning biomass of Pacific hake. This marks a significant step in the management of this important species, which is now regulated primarily on the basis of catch data from the fishery. The results of the study will be published this year in *California Cooperative Oceanic Fisheries Investigations (CalCOFI) Reports*. (H. G. Moser, 619-546-7129)

Continuous Underway Fish Egg Sampler Used to Estimate 1996 Pacific Sardine Spawning Biomass

The continuous underway fish egg sampler (CUFES), developed by David Checkley of Scripps Institution of Oceanography, was used to sample sardine eggs during CalCOFI Cruise 9603-JD. The resulting data were analyzed during the first quarter of 1997 and used to estimate daily egg production of Pacific sardine.

The daily egg production, together with adult parameters estimated from the 1994 DEPM cruise, was used to estimate the spawning biomass. The California Department of Fish and Game used this spawning biomass, together with other biomass time series, to assess the status of sardine off California and northern Baja California, Mexico, for 1996.

The estimated spawning biomass was 385,000 t for an area of 157,000 km^2 from San Diego to south of Monterey Bay, a two- to threefold increase since 1994.

The CUFES is an efficient and inexpensive means of sampling fish eggs, because the ship need not stop to take samples. The resulting data provide not only an estimate of egg production, but also an immediate indication of the eggs' geographic distribution, and thus the spawning area. The spatial distribution of fish eggs, together with oceanographic data, offers an invaluable aid to understanding the biological and physical dynamics of interannual variation in fish populations. The CUFES will be used for all future cruises. (N. C. H. Lo, 619-546-7123)

MARINE MAMMAL DIVISION

La Jolla, California

Reports Completed for Coastwide Cetacean Survey

Cruise reports for the first comprehensive cetacean survey along the entire U.S. West Coast have been completed. From July 17 to November 6, 1996, two NOAA research vessels, *McArthur* and *David Starr Jordan*, carried out the ORCAWALE (ORegon, CAlifornia WAshington Line-transect Experiment) survey to gather information on the abundance of all cetacean species living off the West Coast. Secondary objectives were to collect oceanographic data relating to the distribution of cetaceans, to collect biopsy samples for studies of population genetic structure, and to record diving behavior so that correction factors can be developed to account for animals that are missed by visual observers. The

recently completed cruise reports present a preliminary summary of the methods used and results obtained during this survey.

A total of 150 sea days were dedicated to this project, 90 days on *McArthur* and 60 days on *David Starr Jordan*. Each ship carried 12 scientists, including a cruise leader, marine mammal sighting specialists, photo-identification specialists, oceanographers, and bird observers. During daylight hours, observers used huge, 25X binoculars as well as naked eyes to keep a constant watch for marine mammals. When mammals were sighted, observers determined the species present and estimated their numbers. For some rare species (primarily sperm whales and Baird's beaked whales) detailed behavioral observations were recorded for up to four hours. At night, oceanographic measurements were taken.

A total of 15,200 km were surveyed in a crisscross grid that uniformly covered waters from the coast out 300 nmi. During these surveys, 1,352 groups of marine mammals were seen, including at least 26 different species. Continuous oceanographic data were collected when the ships were under way, and more detailed samples were taken at 196 conductivity-temperature-depth stations. Skin biopsy samples were obtained from 165 cetaceans of 12 different species. Dive intervals were recorded for blue whales, sperm whales, and Baird's beaked whales. The most common small cetaceans seen were Dall's porpoises and short-beaked common dolphins. The most common large whales were blue whales, fin whales, and humpback whales. Enough sightings were made to precisely estimate abundance for most species seen.

Several stocks of marine mammals along the U.S. West Coast are considered to be "strategic" under the 1994 amendments to the Marine Mammal Protection Act (MMPA), either because their take in the Pacific drift gillnet fishery exceeds sustainable levels or because they are considered to be endangered under the Endangered Species Act. Although the cetacean species (whales, dolphins, and porpoises) in part of this region (off California's coast) have been surveyed previously, the ORCAWALE survey is the first comprehensive survey to include the waters off Oregon and Washington. The omission of these waters from previous abundance estimates resulted in a lower estimate of sustainable incidental mortality levels for these stocks. The new abundance estimates are expected to be higher than previous ones, thus making it easier for the Pacific driftnet fishery to meet the immediate MMPA goals of reducing takes of all species to sustainable levels. Revised abundance estimates from these surveys will be presented at the MMPA Pacific Scientific Review Group meeting in May 1997. (J. Barlow, 619-546-7178)

HONOLULU LABORATORY

Honolulu, Hawaii

Satellite Altimetry Used to Study Ocean Currents Relating to Hawaiian Lobster and Swordfish Distributions

The Honolulu Laboratory provides the Western Pacific Regional Fishery Management Council with biological advice on spiny lobsters and swordfish. A major gap in our knowledge of spiny lobsters concerns the extent of larval exchange between banks in the Northwestern Hawaiian Islands and associated physical factors. In the case of swordfish, a significant problem was the inability to describe and monitor the oceanographic features that define the fishing grounds. Altimetry data from the TOPEX/Poseidon satellite have made it possible to address these two issues.

An analytic method was developed in collaboration with Gary Mitchum (University of South Florida) to compute geostrophic current from data on sea-surface height from the TOPEX/Poseidon satellite. Monthly current maps of the central Pacific from November 1992 to the present were developed on a spatial resolution of one-half degree. The data were used to drive a movement model to simulate the transport of lobster larvae during their 12-month pelagic phase. The model revealed that lobster recruitment dynamics differ in the northern and central portions of the Hawaiian Archipelago. Larvae tend to be advected from the north (Maro Reef) to the central portion (Necker Island); thus recruitment in the north is low and sporadic compared to that in the central portion. For swordfish, the current data show that eddies and meanders are the physical features which yield the highest catches for the fishery (Fig. 1). Thus, altimetry data make it possible to monitor spatial and temporal dynamics to interpret changes in fishery CPUE.

TOPEX current vectors and swordfish CPUE

(March 1994)

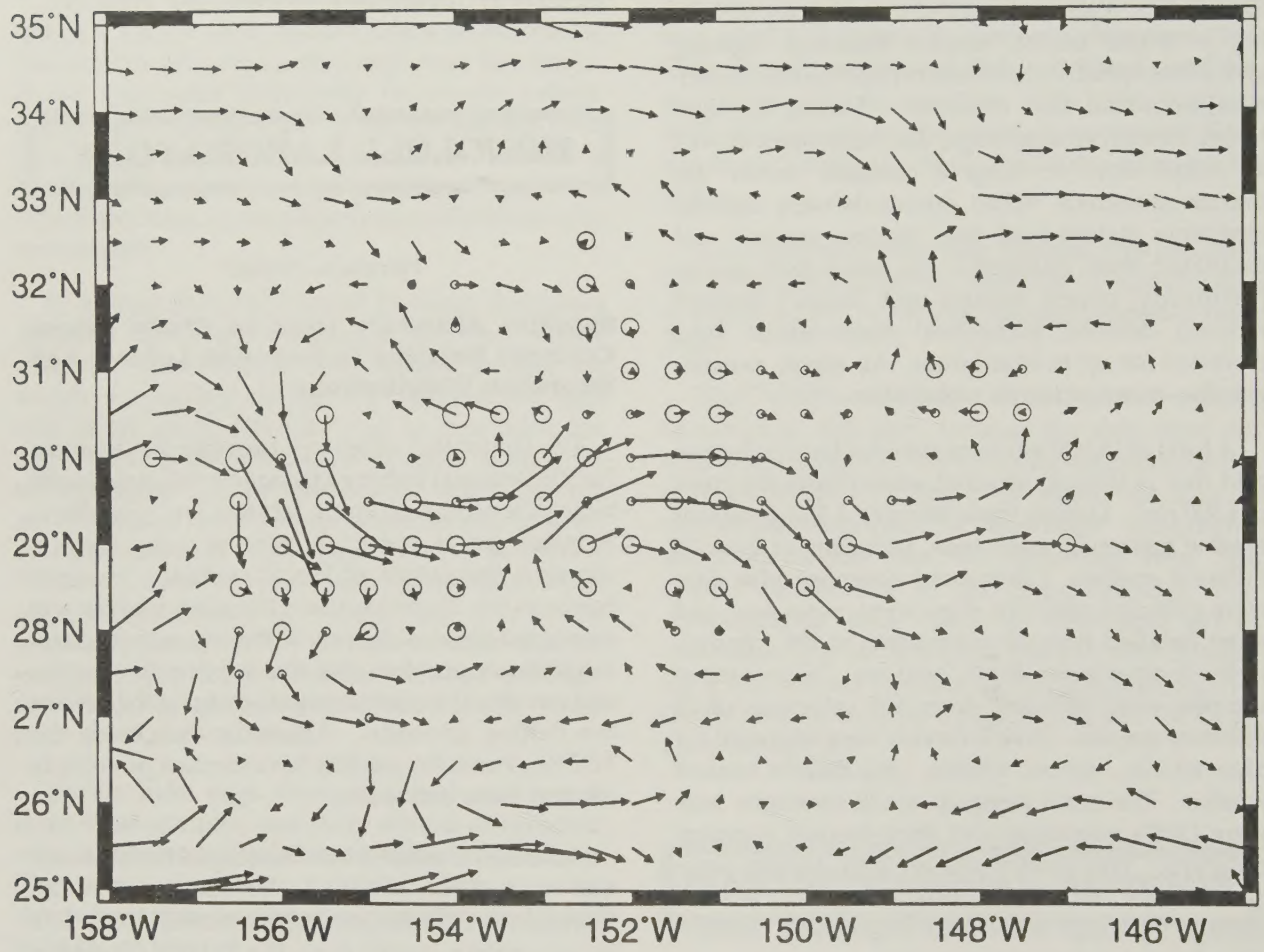

Figure 1. Current vectors computed from altimetry overlaid with swordfish catch rates (circles) from the longline fishery for March 1994. Diameter of circle is proportional to magnitude of catch rate. Current speed is proportional to length of arrow; the longest arrow represents 15 cm/sec.

The new tools in fisheries oceanography have greatly improved the biological advice provided to the Western Pacific Council. The new method for computing geostrophic currents has wide applications in fisheries oceanography. Applying this method to lobster and swordfish yields a new understanding of physical-biological links in central Pacific marine ecosystems. For example, this is the first time high-resolution current data have been available for this area. Also, the new understanding of how transport causes regional differences in lobster recruitment may change the approach to lobster management, as well as provide insight into variations in abundance of prey for the endangered Hawaiian monk seal. Swordfish field research benefits from the ability to use near real-time altimetry data to find eddies and meanders and thus direct research vessels to these features. (J. Polovina, 808-943-1218)

Second International Pacific Swordfish Symposium Convened

The Second International Pacific Swordfish Symposium was held in Kahuku, Hawaii, from March 3 to 6, 1997. The symposium was designed as a forum for the review and synthesis of recent developments in biological, fisheries oceanography, and resource assessment research on swordfish in the Pacific Ocean, and relevant research in other oceans. The goal is to promote international scientific collaboration in assessing Pacific Ocean swordfish.

Approximately 200 people, representing seven countries, participated in the symposium. Thorough descriptions of swordfish fisheries were presented by representatives from the United States, Japan, Mexico, Chile, Australia, and the delegation from Réunion. A representative from the International Convention for the Conservation of Atlantic Tunas reported on the Atlantic "experience," and an expert panel was convened to discuss approaches to stock assessment and data needs. Three working group sessions focused on biological input to stock assessment, fisheries oceanography and habitat, and resource assessment and monitoring. The proceedings of the symposium are scheduled for publication in late 1997.

This symposium falls under the auspices of the newly formed Interim Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC). The ISC hopes to enhance scientific research and cooperation for conservation and rational use of the tuna and tuna-like species that inhabit the north Pacific Ocean during part or all of their life cycles. At the inaugural meeting of the ISC, members adopted swordfish as a species of interest and established a swordfish working group. The ISC endorsed the 1997 symposium, and the United States agreed to coordinate and facilitate it. Furthermore, the ISC agreed that the swordfish working group should organize future symposia.

The conclusions and recommendations drawn from this symposium will benefit each research area dealing with Pacific swordfish. The results should also be of considerably wider interest because many of the biological and migratory features, as well as the research methodologies, may be applicable to swordfish research in other oceans. (G. DiNardo, 808-943-1259)

PACIFIC FISHERIES ENVIRONMENTAL LABORATORY

Pacific Grove, California

California Current Upwelling Studied

Environmental variability on century and global scales can affect marine ecosystems at a variety of smaller scales. In a particularly striking example of how global climate change may be affecting ocean conditions on smaller scales, Andrew Bakun (in a 1990 *Science* paper) postulated that global warming will lead to increased coastal upwelling along eastern ocean boundaries. Boundary ecosystems could be significantly affected because of their highly productive nature and their potentially important role in the global CO_2 budget.

Pacific Fisheries Environmental Laboratory (PFEL) researchers examined the variability of coastal upwelling patterns during spring and summer in the California Current system. Specifically, they tested Bakun's hypothesis that a long-term global warming trend has led to increased equatorward wind stress along the west coast of North America, thus increasing the rates of coastal upwelling.

State-space statistical models were used to separate the seasonal signal from the nonlinear trend in long environmental time series. A systematic increase in equatorward stress and salinity and a decrease in sea-surface temperature and sea level during spring and summer was discovered, providing evidence that coastal upwelling has intensified. This evidence was strongest and most prevalent in areas where seasonal coastal upwelling was a dominant process (32°-40°N). This pattern of increasing upwelling over time cannot be discerned in the monthly observations or trend model series, which overwhelm the seasonal tendency. A long-term warming trend masks seasonal cooling associated with increased upwelling during spring and summer, while the nonseasonal trend in wind stress implies an artificially large increase in seasonal upwelling-favorable stress. Evidence of increased upwelling was also found in fall-winter seasonal data.

The model clarified the coastal ocean's response to long-term variations in atmospheric forcing, as well as the potential contribution of natural and anthropogenic signals, regional differences in these

effects, and ultimately their effect on fishery stocks. The study demonstrates the importance of evaluating temporal and spatial variability over the entire spectrum, rather than simply at global climate scales, when examining long-term environmental fluctuations. It also demonstrates the importance of considering changes in seasonal patterns independently of changes in the long-term climate trend. The results of the study were published in the March 1997 edition of the *Journal of Geophysical Research.* (F. Schwing, 408-648-9034)

Environmental Data Workshop Report Published

An increasing awareness of the importance of environmental variability in the management of fishery populations, protected species, and ecosystems requires that NMFS improve its capabilities for using environmental information. Many federal and state agencies collect and compile environmental data, and new computer and database technologies are rapidly advancing, making it difficult for NMFS scientists to keep up with changes. A meeting was co-convened in Pacific Grove, California, on July 16–18, 1996, by NMFS and the NOAA Office of Oceanic and Atmospheric Research. All five NMFS science centers as well as headquarters were represented at the workshop, as were most line offices of NOAA, the National Aeronautics and Space Administration (NASA), the Navy, the National Science Foundation, Canada, Great Britain, and seven academic institutions. The workshop was funded by the NOAA Environmental Sciences Data Information Management program, with supplemental funding from the National Science Foundation.

The workshop was designed to (1) assess current and future needs for environmental databases (oceanographic, atmospheric, remote sensing, model output, and geological) in fisheries research and management; (2) identify data sources and formats; and (3) recommend ways to facilitate access to the data.

PFEL scientists have completed a report of the workshop (Boehlert, G. W., and J. D. Schumacher [eds.]. 1997. Changing oceans and changing fisheries: environmental data for fisheries research and management. U.S. Dep. Commer., NOAA Tech. Memo., NOAA-TM-NMFS-SWFSC-239, 146 p.). The report includes six papers by fisheries scientists addressing how environmental data are used in fisheries-related investigations, and eight papers by physical and computer scientists from NASA, NOAA, and the Navy describing available environmental data, including that from ocean models and geophysical investigations. Additional abstracts from demonstrations of ocean models and data management systems, poster presentations, and contributed abstracts are also included, as are written reports from five working groups, and a priority list of recommendations.

The workshop report provides important information on using environmental data in fisheries research and management, new environmental data sources, and high-priority activities for this arena. (G. Boehlert, 408-648-8515)

Salmon Tagging Technologies Subject of Workshop

The declining survival of several salmonid stocks on the West Coast has raised alarms in the scientific, environmental, and fishing communities. Central California coho salmon have been listed as threatened under the Endangered Species Act (ESA), and other stocks in northern California and Oregon are being considered for listing. The causes of declining stocks are complex and various; they include changes in freshwater flow, dams, habitat degradation, hatchery practices, climate variability, and ocean conditions. Fluctuations in survival in the estuary and ocean cannot be understood without improved knowledge of salmon movements and habitat use during different life-history stages, and knowledge about the influence of environmental variability.

Tag technology is a relatively fast-moving field, and several salmonid biologists are interested in applying the new methods. A workshop was convened in Seattle in September 1996 to promote communication among scientists interested in salmon and the technologists and engineers who are developing tags. The general goal was to discuss how acoustic and data-logging tags can indicate the way salmon use estuarine and ocean environments during different life-history stages. The resulting information should clarify how environmental factors affect salmon movements and survival.

A report on the workshop produced by PFEL staff (Boehlert, G. W. [ed.]. 1997. Application of acoustic and archival tags to assess estuarine, nearshore, and ofshore habitat utilization and movement by salmonids. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-236, 62 p.) includes three introductory papers offering perspectives on the important research needs; papers dealing with applications of acoustic or data-logging tags, and associated research; and

technological papers on the status and evaluation of tags. A written summary of two workshop discussion groups—one on biology, ecology, and oceanography, and the other on technology—is augmented by a series of recommendations. Finally, the volume includes several abstracts on pertinent biology and technology.

Understanding salmonid movements and use of habitat is critical for evaluating the sources of mortality. New tagging technologies can address several key questions on this topic. It is hoped that the published volume will foster communication and promote the development of tagging technologies specific to salmon. (G. Boehlert, 408-648-8515)

Oceanographic Data and Data Products Converted from Navy Computers to New IT-95 System

Since PFEL's earliest days, the Navy's Fleet Numerical Meteorology and Oceanography Center (FNMOC) has hosted the computational processes supporting routine and special product preparation. Over the last several years, the Navy's computational environment has undergone major changes in hardware, software, and data systems. These changes eventually led to the shutdown of the mainframe computers traditionally used by PFEL for archiving data and producing products. In addition, FNMOC has converted its formats for maintaining and transmitting data. Thus it became necessary for PFEL to convert data archiving and product development to its IT-95 computer, while continuing to support strong cooperative bonds between NOAA and the Navy.

All software has been converted from the mainframe computers to PFEL's IT-95 server under the open Unix operating system. The entire historical archive of source data and product sets used in PFEL's product preparation was converted to FNMOC's new data formats. Programs and transmission procedures were established so that data and product sets formerly accessed from archival magnetic tape volumes prepared by FNMOC can be routinely received from the Navy onto PFEL's IT-95 system over the Internet under automated FTP processes; the products can now be produced on PFEL's IT-95 system. Users of PFEL's oceanographic products can now receive delivery over the Internet through similar FTP processes, and through PFEL's home page. In addition, PFEL has been able to expand its range of products.

The recently completed conversion makes it possible for PFEL to continue delivery to its many users, while significantly improving turnaround time and ease of access. This successful project required significant cooperative efforts by the Navy and NOAA, which were greatly facilitated by the long-standing cooperation between the Navy and PFEL. (R. Mendelssohn, 408-648-9029)

PELAGIC FISHERIES RESOURCES DIVISION

La Jolla, California

Report Provides Results of a Meeting of Western Pacific Yellowfin Tuna Research Group

The Western Pacific Yellowfin Tuna Research Group is an informal, international group of scientists and fisheries managers who meet annually to evaluate the central and western Pacific yellowfin tuna fisheries and to assess the condition of the stock. Reports of the meetings are published in a series begun by the SWFSC in partnership with the South Pacific Commission. "Report of the fifth meeting of the Western Pacific Yellowfin Tuna Research Group, Noumea, New Caledonia, August 21-23, 1995" was completed in November 1996 and distributed in January 1997.

The group's research indicates that the yellowfin tuna stock in the central and western Pacific appears to be healthy, although with some signs of declining abundance. The catch was an estimated 370,300 t in 1994, down from a historic high of 397,600 t in 1993. There is growing concern that this high catch adversely affects the production of an associated species, bigeye tuna. Bigeye tuna, particularly immature individuals, are caught with yellowfin tuna. Because the two species are difficult to distinguish, bigeye tuna is often mislabeled as yellowfin tuna, and the amount of bigeye tuna caught is uncertain. The group, which provides statistics on all tuna species taken by the central and western Pacific tropical tuna fishery, developed a plan for improving catch statistics on bigeye tuna, for evaluating how the yellowfin tuna fishery affects the catch of bigeye tuna, and for verifying the status of the yellowfin tuna stocks.

The meeting reports, which have a wide distribution and readership, keep scientists and managers apprised of progress in research, developments in the tropical tuna fisheries, and current condition of

the yellowfin tuna stock of the central and western Pacific Ocean. The reports also provide technical information for resolving current and emerging fishery management issues. The SWFSC's support of the group and publication of its reports further U.S. goals of providing leadership in collaborative tuna research for the western Pacific and advancing fishery management decisions that are based on scientific information. (G. Sakagawa, 619-546-7177)

TIBURON LABORATORY

Tiburon, California

New NMFS Research Laboratory Planned for Santa Cruz Site

The National Marine Fisheries Service has developed plans to relocate the Tiburon Laboratory to a site adjacent to the University of California's Long Marine Laboratory in Santa Cruz, California.

The Tiburon Laboratory originated in 1962 as a marine sportfish research facility for the U.S. Fish and Wildlife Service's Bureau of Sport Fisheries and Wildlife. The facility comprised a variety of buildings which had served as a U.S. naval base for almost a century. When the National Oceanic and Atmospheric Administration was created in 1970, the Tiburon Laboratory became a part of NOAA and the NMFS, as did all Bureau of Sport Fisheries laboratories studying marine (rather than freshwater) fishes. At that time the principal research at Tiburon included billfish studies that were centered in southern California and Mexico.

Tiburon Laboratory scientists have conducted varied field and laboratory studies of estuaries and marine waters, covering subjects such as fishery ecology, toxicology, taxonomy, and dynamics. Recently, the mission of the Tiburon Laboratory has evolved toward activities supporting the management of anadromous resources. The current purpose of the Tiburon Laboratory is to conduct research on marine, estuarine, and anadromous fish populations and their environments, primarily in central and northern California. Present studies involve groundfish species, with an emphasis on rockfishes (*Sebastes* spp.), as well as salmonid species that are designated as threatened or endangered. The Tiburon Laboratory also studies environmental influences on these resources, including aspects of habitat quality, ecosystem health, and climate change.

With the change in research direction, the growth of staff, and the increasing burden of maintaining and upgrading a deteriorating facility, NMFS decided to relocate the Tiburon Laboratory to a site in Santa Cruz that is being developed as a marine research center. The Long Marine Laboratory and the newly constructed California Department of Fish and Game Oiled Wildlife Rescue Center already occupy the site. Within the next few months, the Long Marine Laboratory will begin constructing a new visitor education center. The 2.5-acre site selected for the new Tiburon Laboratory lies among these institutions and is being designed as part of a larger research community.

Architectural and engineering work has begun on the facility. The building is being designed as a full-service fisheries research laboratory and office complex to meet the needs of SWFSC scientists and fishery and habitat managers from the NMFS Southwest Region for the next 50 to 75 years.

The design under development shows a facility of approximately 55,000 gross square feet that will accommodate about 43 staff members (Fig. 1). Included are offices concentrated along a south-facing axis overlooking the Pacific Ocean, a series of small meeting rooms that can also be used as dry laboratories or work rooms, and a specialized fisheries research library. For wet science applications, a large biology laboratory, a

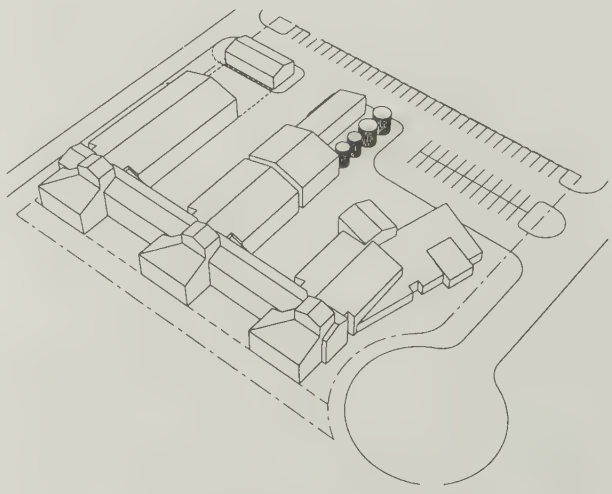

Figure 1. Representation of the new NMFS research laboratory.

chemistry laboratory, a dissection room, several specialized instrument rooms, and a walk-in freezer are planned. Experiments will be conducted in a large aquarium room with high-quality seawater and freshwater systems. Since much fisheries survey and field research requires extensive equipment (boats, nets, traps, etc.), there will be a substantial dry storage area as well as mechanical and electronic shops for repairing, modifying, and maintaining equipment, and a full-service dive locker for scuba divers.

The new, modern facility will expand and enhance the research and management capability of the NMFS staff. The move to the Monterey Bay area will also make it possible to join a world-renowned marine science education and research community that includes six marine research institutions, eleven government marine agencies, and four major universities—along 45 miles of coastline bordering one of the world's most diverse and productive marine habitats. (M. Eldridge, 415-425-3149, ext. 243)

Report Outlines Preliminary Results of Recent Biological Surveys at Ocean Disposal Site

Tiburon Laboratory researchers have prepared a report for the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (EPA) on three biological surveys of the San Francisco Deep Ocean Disposal Site (SF-DODS). The unpublished report summarizes hydrographic and biological information and compares plankton and micronekton abundance in order to evaluate how the disposal of dredged materials may affect the site.

Disposal of dredged materials at sea is one component of a long-term waste management strategy being developed for the San Francisco Bay region. The EPA and the California State Water Resources Control Board are the lead federal and state agencies in this effort. In 1994, the EPA designated the SF-DODS at a location approximately 50 miles west of the Golden Gate Bridge, where the water is about 3,000 m deep. The site designation included a requirement that the area be monitored for adverse effects caused by the disposal of dredged materials. As one facet of this goal, the Corps of Engineers contracted with the SWFSC's Tiburon Laboratory to evaluate how the dumping of dredge spoils affects ichthyoplankton and micronekton in the upper 200 m of the water column.

Tiburon Laboratory scientists began monitoring the upper water column at the disposal site in February 1996; additional research cruises were made in June and September. Abundances were compared for three sites: the SF-DODS, a reference control area, and the peripheral region around the SF-DODS. Data analysis shows that the biota at the reference site differed from that at the SF-DODS, as did the hydrographic environment. These changes are thought to be associated with changes in water mass rather than with the presence of dredged materials. Preliminary results show no strong evidence of harm or dramatic changes to marine life.

The researchers began a fourth biological survey of the site in late February to monitor how the disposal of dredged materials may affect marine fishes and other important organisms, including Pacific hake, rockfishes, and flatfishes. The monitoring program is funded by the Corps of Engineers and the EPA. (S. Ralston, 415- 435-3149, ext. 229)

Report Examines Methods for Estimating Escapement of Sacramento Winter-Run Chinook Salmon

A draft report reviewing the current method for taking the winter-run chinook salmon census was recently submitted to the NMFS Southwest Region. The report discusses the limitations of the current censusing method and presents alternative techniques in light of their feasibility, cost, and expected precision and accuracy. Because winter-run chinook salmon are rare, the Sacramento is large and sometimes turbid, and many techniques might adversely affect adult or juvenile salmon migration, no easy technological fix was identified.

The report synthesizes a variety of information from published literature, internal agency reports, and discussions with field workers on the Sacramento River. It recommends continued monitoring of fish passage at Red Bluff, modification of current carcass capture and recapture studies to improve accuracy and precision, and development of juvenile production estimates from widespread but unintegrated juvenile sampling programs. Finally, the report presents model results indicating that even if winter-run chinook salmon populations are recovering at substantial rates, recovery will not be statistically detectable for 6 to 15 years.

Managing species protected under the Endangered Species Act requires knowledge of population sizes and trends. In the case of Sacramento winter-run chinook salmon, the number of spawning fish is used as the basis for fishing regulations and juvenile take limits. The findings and recommendations presented in the report will be useful to NMFS managers hoping to improve winter-run chinook salmon census information, and will provide a context for interpreting current and historical population estimates. Ultimately, population sizes and growth rates will be used to determine when winter-run chinook salmon can be delisted under the act. (S. Lindley, 415-425-3149, ext. 217)

INFORMATION TECHNOLOGY SERVICES

Video-Conferencing Unit Installed

The installation and testing of video-conferencing equipment were completed at the La Jolla Laboratory on March 14, 1997, after several installation problems were resolved. The system makes it possible to conduct video meetings with similarly equipped locations. The NMFS headquarters, regional offices, science centers, and a few other NMFS locations (including Honolulu and Santa Rosa) will now be able to conduct video conferences with groups at one or more locations.

Video-conferencing equipment improves on voice conferencing by adding a visual aspect to interpersonal communications and making it possible to use overhead illustrations and whiteboards. Video conferences allow participants to stay in familiar territory, where they have better access to their resources (computers, files, assistants), and make it easier to schedule meetings involving people from different locations. Savings in direct travel costs and in travel time make it possible for a wider variety of staff to participate in important regional and national meetings.

The SWFSC's start-up costs for the initiative were paid with fiscal year 1996 funding. Operational costs for fiscal year 1997 will be paid by NMFS headquarters. (F. Ralston, 619-546-7062)

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